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10/024,208	12/21/2001	David J. Cooperberg	015290-546	9076

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EXAMINER
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ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/024,208

Applicant(s)

COOPERBERG ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 06/06/06.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13-15 and 39-61 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-15 and 39-61 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

The following office action is in response to the new grounds of rejection imposed by the Board of Appeals decision mailed 04/06/06.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-11, 13-14, and 39-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ni et al., WO 00/41212 in view of Chang, WO 99/57747 or Murugesh et al., U.S. Patent 6,450,117 and Arami et al., U.S. Patent 5,958,140, or Goodyear et al., U.S. Patent 5,532,190, or Balance et al., U.S. Patent 6,090,210.

Ni et al. shows the invention substantially as claimed including Ni et al. shows the invention substantially as claimed including a plasma processing system used for etching or CVD comprising: a plasma processing chamber 10, a vacuum pump connected to outlet 15 of the processing chamber; a substrate support 12 on which a substrate 13 is processed within the processing chamber; a dielectric member 20 and having an interior surface facing the substrate support, wherein the dielectric member forms a wall of the processing chamber; a gas injector 22 having conical or cylindrical side surfaces and being removably mounted in the dielectric window (see page 13, lines 20-25) and extending through the dielectric member, the gas injector comprising a body including an axial end-face exposed within the processing chamber, a side surface extending axially from the axial end surface, and a plurality of gas outlets supplying process gas at a sonic or supersonic velocity (see page 16, lines 14-15) including at least one on-axis outlet in the axial end surface and a plurality of spaced-apart off-axis outlets in the side surface, the off-axis outlets inject process gas at an acute angle relative to a plane parallel to an exposed surface of the substrate, and an RF energy source 18 comprising an RF antenna in the shape of a planar or non-planar spiral coil which inductively couples RF energy through the dielectric member and into the chamber to energize the process gas into a plasma state to process the substrate (see, for example, figs. 1 and 3A-3C, and page 9-line 8 to page 10-line 25).

Ni et al. fails to expressly disclose the gas injector including a common gas supply and an annular passage in fluid communication with a first gas line and a second gas line, the first gas line being in fluid communication with the on-axis outlet but not

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with the off-axis outlets and the second gas line being in fluid communication with the off-axis outlets but not with the on-axis outlets, and flow controllers operable to supply process gas from the common gas supply at flow rates that are independently varied between the on-axis and the off-axis outlets into the processing chamber. Chang discloses a gas injector that comprises an injector body including at least first and second gas inlets, at least first and second gas passages, and at least first and second gas outlets, the first gas passage being in fluid communication with the first inlet and first outlet, and the second gas passage being in fluid communication with the second inlet and second outlet, the first and second gas passages not being in fluid communication with each other (see, for example, figs. 1 and 7, and their descriptions). Alternatively, Murugesh et al. discloses an apparatus comprising a gas injector, the gas injector comprising a body including an axial end surface exposed within the processing chamber, a side surface extending axially from the axial end surface, and a plurality of gas outlets 85/247 including at least one on-axis outlet 85 in the axial end surface and a plurality of circumferentially spaced-apart off-axis outlets in the side surface, a first gas line and a second gas line, the first gas line being in fluid communication with the on-axis outlet but not with the off-axis outlets and the second gas line being in fluid communication with the off-axis outlets but not with the on-axis outlet, wherein the outlets are disposed within the chamber and below the chamber ceiling (see, for example, figs. 2a, 2b and 3, and their description, and col. 2, lines 51-55). Therefore, in view of these disclosures, it would have been obvious to one having ordinary skill in the

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art at the time the invention was made to modify the apparatus of Ni et al. as to comprise the gas injector suggested by Murugesh et al. and Chang et al. in order to optimize the delivery of gasses into the chamber and in order to direct gas preferentially across a surface of the chamber.

Furthermore, Ni et al., Chang and Murugesh et al. do not expressly disclose a common gas supply including a single third gas line in fluid communication with the first gas line and the second gas line. Arami et al., Goodyear et al., and Ballance et al., disclose an apparatus comprising a gas injecting system in which a common gas supply 41,42,43/55,56 / 314 including a third gas line coming from the gas supply is in fluid communication with a first gas line 38/ 21 /312 and a second gas line 39/ 22 / 310, the first gas line being in fluid communication with a first outlet and the second line being connected to second outlets, wherein the first line is in fluid communication with the first outlet but not with the second outlets and the second gas line being in fluid communication with the second outlets but not with the first outlet (see, for example, fig. 2 of Arami et al. and its description, fig. 1 of Goodyear et al. and its description, and fig. 8 of Ballance et al. and its description). Therefore, in view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the gas supply system of the apparatus of Ni et al. modified by Chang and Murugesh et al. so as to comprise a common gas supply including a single third gas line in fluid communication with the first gas line and the second gas line, in order to enable the injection of the same gas, to the processing chamber, through the on-axis outlet and the off-axis outlets. Furthermore, note that all the references disclose the use of flow

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controllers operable to supply the process gas from the common gas supply at flow rates that are independently varied toward the first line and the second line. Also, Arami et al. and Goodyear et al. disclose the use of a network of gas valves and throttling elements to independently vary the gas flow.

Additionally, note that the apparatus of Ni et al. modified by Chang and Murugesh et al.: a) the gas injector injects the process gas toward a primary plasma generation zone in the chamber, b) the first gas line is in fluid communication with an axially extending central bore in the injector body, and the second gas line is in fluid communication with an annular gas passage surrounding the central bore, c) the injector body is cylindrical shaped and the off-axis outlets are circumferentially spaced apart, and d) at least one of the on-axis and the off-axis outlets has a uniform diameter along the entire length thereof.

With respect to claim 49, note that Murugesh et al. discloses the use of more than two circumferentially spaced apart off-axis outlets. Furthermore, a prima case of obviousness still exists because it would have been an obvious choice of design to one of ordinary skill in the art to optimize the total number of off-axis outlets during routine experimentation depending upon, for example, the desired locations to which the gas is desired to be injected, and would not lend patentability to the instant application absent the showing of unexpected results.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ni et al., WO 00/41212 in view of Chang, WO 99/57747 or Murugesh et al., U.S. Patent

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6,450,117, and Arami et al., U.S. Patent 5,958,140, or Goodyear et al., U.S. Patent 5,532,190, or Ballance et al., U.S. Patent 6,090,210 as applied to claims 1-11, 13-14, and 39-61 above, and further in view of Powell et al., U.S. Patent 6,287,643.

Ni et al., Chang, Murugesh et al., Arami et al., Goodyear et al. and Ballance et al. are applied as above but do not expressly disclose that the gas injector is further provided with an electrically conducting shield. Powell et al. discloses an apparatus comprising a gas injection tube 84 provided with an electrically conducting shield (see col. 9, lines 33-50) that minimizes plasma ignition until the gas reaches the main chamber (see Fig. 5 and col. 7-line 57 to col. 9-line 50). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Ni et al. modified by Chang, Murugesh et al., Arami et al., Goodyear et al. or Ballance et al., so as to further comprise an electrically conducting shield for the gas injector in order to minimize the plasma ignition within the injector because plasma ignition within the injector can result in detrimental effects such as damage to the injector as well as uniformity problems with processing within the chamber.

### ***Response to Arguments***

Applicant's arguments filed 06/06/06 have been fully considered but they are not persuasive. However, the rejections of the examiner affirmed by the Board of Appeals on the decision of 04/06/06 and the new grounds of rejection imposed by the Board of Appeals with respect to claims 10, 40, 46-47, and 59 under 35 USC 112, second



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paragraph are withdrawn since applicant's amendments to the claims have overcome both of these rejections. Concerning the rejection under 35 USC 103 of claims 51-55 using the Hassan et al. reference, U.S. Patent 4,270,999 is withdrawn since the Ni et al. reference contains these limitations.

Regarding the rejection over Ni et al., Chang or Murugesh et al., and Arami et al. or Goodyear et al. or Balance et al., it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Concerning applicant's argument that a prima facie case of obviousness has not been established, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine the references is clearly stated in the above rejections.

With respect to applicant's argument concerning Goodyear explicitly teaching against a common gas supply which would supply an identical gas composition to the gas lines, the examiner respectfully disagrees with such a statement, but even

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assuming that such a statement is true, it should be noted that: a) the rejected claims do not require that the common gas supplies identical gas composition to the gas lines, and b) such limitation is directed to a method limitation instead of an apparatus limitation, and a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

In response to applicant's arguments against the Ballance et al. reference individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

With respect to applicant's argument that Ni et al. does not disclose a "conical" side surface or off axis outlets in a side surface of the injector, applicant is respectfully directed to, for example, figs. 3A-3C which clearly show conical surfaces. Furthermore, as stated by the Board, Ni et al. would have taught "that the injector can have outlets in different configurations, including a center outlet or no outlet in the axial end surface..."

In response to applicant's arguments against the Ni et al. reference individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore, with respect to applicant's argument that the modification of Ni

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et al. would require very extensive engineering design if the references were combined as suggested, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Concerning the argument that Ni et al. is not concerned with achieving uniformity in different steps of a multi-step etch process using the same injector, it is noted that the features upon which applicant relies (i.e., achieving uniformity in different steps of a multi-step etch process using the same injector) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Concerning applicant's argument that Chang and Murugesh fail to suggest a gas injection system that supplies the same gas from a common gas supply to all on and off axes of the gas injector, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). It should be noted that neither Chang nor Murugesh are used to show a gas injection system that supply the same gas from a common gas

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supply to a plurality of gas outlets. The Arami et al., Ballance et al. and Goodyear et al. references have been relied upon to show this feature.

With respect to applicant's argument that Arami et al., Goodyear et al., and Ballance et al. are applied improperly since they disclose showerhead-type injection systems, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Concerning applicant's argument that the Arami et al. reference does not disclose "only a common gas supply" in fluid communication with the gas outlets, it should be noted that the claim does not require only a common gas supply, therefore, a reference disclosing more than one gas supply is not precluded from properly rejecting the claims.

Furthermore, and with respect to applicant's argument that the Arami et al. reference does not suggest "a common gas supply" (note that in this argument applicant does not use the word only), it should be noted that Arami et al. does disclose a common gas supply, for example, gas supply 41, connected to the gas outlets. Note that as broadly claimed, a reference disclosing more than one gas supply is not precluded from properly rejecting the claims.

In response to applicant's arguments against the Powell et al. reference individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642

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F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Regarding the declaration under 37 CFR 1.132, expected beneficial results are evidence of obviousness of a claimed invention *In re Gershon*, 372 F.2d 535, 538, 152 USPQ 602, 604 (CCPA 1967). In this case, it would have been expected that added controllability to the injector of Ni et al. would allow for improved controllability and better results with respect to different etching processes, as shown by the declaration. Furthermore, a portion of the declaration states that the claimed subject matter solved a problem that was long standing in the art, and that the inventor discovered the source of a problem (see item 4). However, there is no showing that others of ordinary skill in the art were working on the problem and if so, for how long. In addition, there is no evidence that if persons skilled in the art who were presumably working on the problem knew of the teachings of the above cited references, they would still be unable to solve the problem. See MPEP § 716.04. In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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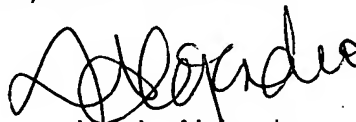
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Luz L. Alejandro  
Primary Examiner  
Art Unit 1763

September 5, 2006